

## WHAT IS CLAIMED IS:

## 1. A linear illumination device comprising:

a guide made of a light transmitting material extending in a first direction, having a side face and at least one end face;

light emitting means for allowing light to enter interior of the guide from the at least one end face of the guide; and

a light diffusing section formed on part of the side face of the guide, for diffusing the light incident thereon by refraction,

wherein at least part of the light entering the interior of the guide goes out from part of the side face of the guide facing the light diffusing section, thereby providing substantially linear illumination light along the first direction.

2. A linear illumination device according to claim 1, wherein the light transmitting material has a light transmittance of 80% or more measured in accordance with ASTM measuring method D1003.

3. A linear illumination device according to claim 1, wherein a refractive index of the light transmitting material is substantially in the range of 1.4 to 1.7.

4. A linear illumination device according to claim 1, wherein the light transmitting material is acrylic.

5. A linear illumination device according to claim 1, wherein the light transmitting material is polycarbonate.

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6. A linear illumination device according to claim 1, wherein the guide has two end faces opposing each other, and the light emitting means includes two light emitters for allowing the light to enter the guide from the two end faces.

7. A linear illumination device according to claim 1, wherein the guide has two end faces opposing each other, and the light emitting means allows the light to enter the guide from one of the two end faces, the other end face being a mirror face or a reflective face.

8. A linear illumination device according to claim 1, wherein the light diffusing section includes a groove formed on part of the side face of the guide and a light diffusing layer provided on the groove.

9. A linear illumination device according to claim 1, wherein the light diffusing section has a rough surface.

10. A linear illumination device according to claim 9, wherein the light diffusing section has center line average roughness  $R_a$  is in the range of (100 to 0.013)  $\mu$ m and the maximum height  $R_{max}$  is in the range of (400 to 0.05)  $\mu$ m in terms of surface roughness indicated in JIS standard B0601.

11. A linear illumination device according to claim 1, wherein a surface of the light diffusing section has a triangular wave shape or a sawtooth shape.

12. A linear illumination device according to claim 11, wherein a surface of the light diffusing section has a

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triangular wave shape having a pitch in the range of 50  $\mu\text{m}$  to 2000  $\mu\text{m}$  and a height at a peak in the range of 20  $\mu\text{m}$  to 800  $\mu\text{m}$ .

13. A linear illumination device according to claim 1, wherein the light diffusing section is formed on part of the side face of the guide as one continuous part in the first direction.

14. A linear illumination device according to claim 1, wherein the light diffusing section is formed on part of the side face of the guide at intervals in the first direction.

15. A linear illumination device according to claim 1, wherein a total reflection layer is formed on the entire side face of the guide excluding the light diffusing section and part facing the light diffusing section.

16. A linear illumination device according to claim 1, wherein the light diffusing section is a diffusing layer.

17. A linear illumination device according to claim 16, wherein the diffusing layer is made of a light diffuser and a light transmitting resin.

18. A linear illumination device according to claim 17, wherein a refractive index of the light diffuser is larger than that of the guide.

19. A linear illumination device according to claim 17, wherein a refractive index of the light transmitting resin is substantially equal to that of the guide.

20. A linear illumination device according to claim 17, wherein the light diffuser is  $TiO_2$ .

21. A linear illumination device according to claim 17, wherein the light diffuser is  $TiO_2$ , and the light transmitting resin is a silicon resin.

22. A linear illumination device according to claim 1, wherein the light emitting means has at least one light emitting diode.

23. A linear illumination device according to claim 6, wherein each of the two light emitters has at least one light emitting diode.

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24. A linear illumination device according to claim 1, wherein the light emitting means has a light emitting angle distribution in the range of 30 to 150 degrees.

25. A linear illumination device according to claim 6, wherein the guide has a pillar shape extending in the first direction.

26. A linear illumination device according to claim 25, wherein the light diffuser is formed in the first direction as one continuous part.

27. A linear illumination device according to claim 26, wherein a width of the light diffusing section in a second direction is constant, the second direction being perpendicular to the first direction.

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28. A linear illumination device according to claim 26, wherein a width of the light diffusing section in a second direction perpendicular to the first direction gradually increases as approaching a central portion of the guide from the two end faces.

29. A linear illumination device according to claim 25, wherein the light diffusing section is formed at constant intervals in the first direction.

30. A linear illumination device according to claim 29, wherein the light diffusing section is formed in a constant shape.

31. A linear illumination device according to claim 29, wherein an area of the light diffusing section gradually increases as approaching a central portion from the two end faces.

32. A linear illumination device according to claim 25, wherein the light diffusing section is formed in the first direction at intervals, the intervals gradually decreasing as approaching a central portion from the two end faces of the guide.

33. A linear illumination device according to claim 26, wherein the light diffusing section is made of a light diffuser and a light transmitting resin.

34. A linear illumination device according to claim 26, further comprising a diffusing layer formed on an entire surface or part of the light diffusing section.

35. A linear illumination device according to claim 29, wherein the light diffusing section is a diffusing layer made of a light diffuser and a light transmitting resin.
36. A linear illumination device according to claim 29, further comprising a diffusing layer formed on an entire surface or part of the light diffusing section.
37. A linear illumination device according to claim 32, wherein the light diffusing layer is made of a light diffuser and a light transmitting resin.
38. A linear illumination device according to claim 32, further comprising a diffusing layer formed on an entire surface or part of the light diffusing section.
39. A linear illumination device according to claim 25, wherein the guide has a polygonal pillar shape.
40. A linear illumination device according to claim 25, wherein the guide has a cylindrical shape.
41. A linear illumination device according to claim 40, wherein two planes forming a predetermined angle therebetween are provided in part of the side face of the guide facing the light diffusing section.
42. A linear illumination device according to claim 41, wherein the predetermined angle is 90 degrees.
43. A linear illumination device according to claim 40, wherein a V-shaped cut face, which has such a shape that a width and a depth in a second direction perpendicular

to the first direction gradually increase as approaching a central portion of the guide from the two end faces, is formed on the side face of the guide.

44. A linear illumination device according to claim 43, wherein the light diffusing section is formed on an entire surface or part of the V-shape cut face.

45. A linear illumination device according to claim 6, wherein the guide has such a shape that a cross-sectional area of the guide gradually decreases as approaching a central portion between the two end faces.

46. A linear illumination device according to claim 45, wherein the light diffusing section is formed in the first direction as one continuous part.

47. A linear illumination device according to claim 46, wherein a width of the light diffusing section in a second direction perpendicular to the first direction is constant.

48. A linear illumination device according to claim 46, wherein a width of the light diffusing section in a second direction perpendicular to the first direction gradually increasing as approaching a central portion of the guide between the two end faces.

49. A linear illumination device according to claim 45, wherein the light diffusing section is formed in the first direction at constant intervals.

50. A linear illumination device according to claim 49, wherein the light diffusing section is formed in a constant shape.

51. A linear illumination device according to claim 49, wherein an area of the light diffusing section gradually increases as approaching a central portion of the guide between the two end faces.

52. A linear illumination device according to claim 45, wherein the light diffusing section is formed in the first direction at intervals gradually decreasing as approaching a central portion of the guide between the two end faces.

53. A linear illumination device according to claim 46, wherein the light diffusing section is a diffusing layer made of a light diffuser and a light transmitting resin.

54. A linear illumination device according to claim 46, further comprising a diffusing layer formed on an entire surface or part of the light diffusing section.

55. A linear illumination device according to claim 49, wherein the light diffusing section is made of a light diffuser and a light transmitting resin.

56. A linear illumination device according to claim 49, further comprising a diffusing layer formed on an entire surface or part of the light diffusing section.

57. A linear illumination device according to claim 52, wherein the light diffusing section is made of a light

diffuser and a light transmitting resin.

58. A linear illumination device according to claim 52, further comprising a diffusing layer formed on an entire surface or part of the light diffusing section.

59. A linear illumination device according to claim 45, wherein a cross-section of the guide has a similar shape as that of each of the two end faces, and each of the two end faces has a polygonal cross-section.

60. A linear illumination device according to claim 45, wherein a cross-section of the guide has a similar shape to that of each of the two end faces, and each of the two end faces has a circular cross-section.

61. A linear illumination device according to claim 60, wherein two plane forming a predetermined angle therebetween are provided in part of the side face of the guide facing the light diffusing section.

62. A linear illumination device according to claim 61, wherein the predetermined angle is 90 degrees.

63. A linear illumination device according to claim 45, wherein the side face of the guide contains a straight line parallel to the first direction, the straight line connecting a point on a circumference of one of the end faces to a corresponding point on a circumference of the other of the end faces.

64. A linear illumination device according to claim 63, wherein the guide has a circular cross-section.

65. A linear illumination device according to claim 63, wherein part of the side face of the guide facing the light diffusing section contains the straight line, and at least part of the light beams goes out from a vicinity of the straight line.

66. A linear illumination device according to claim 65, wherein two planes forming a predetermined angle therebetween are provided in part of the side face of the guide facing the light diffusing section.

67. A linear illumination device according to claim 66, wherein the predetermined angle is 90 degrees.

68. A linear illumination device according to claim 65, wherein an area of a cross-section of a central portion of the guide is 70% or less of an area of each of the two end faces.

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69. A linear illumination device according to claim 1, wherein the light emitting means emits red light, green light and blue light in a time divided manner.

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70. A linear illumination device according to claim 22, wherein the light emitting means emits red light, green light and blue light in a time divided manner.

<sup>69</sup>  
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71. A linear illumination device according to claim <sup>24</sup> 70, wherein the light emitting means includes three light emitting diodes respectively emitting the red light, the green light and the blue light.

<sup>70</sup>  
72. A linear illumination device according to claim 23,

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wherein the light emitting means includes three light emitting diodes respectively emitting the red light, the green light and the blue light.

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